



SEE THE CHANGE USA

Bringing **Physics** to Middle Schools of America



Jobs Council

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“The Big Problem”

- U.S. Department of Labor - By 2018, the U.S. will have 1.2 million job openings in science, technology, engineering and math related fields.
- Attrition of Science & Engineer students at the University level: more than 40% of US students switch majors or drop out.
- Students in other countries are outperforming our highest-achieving students: U.S. students scored below 26 countries on mathematics, and below 21 countries in science.

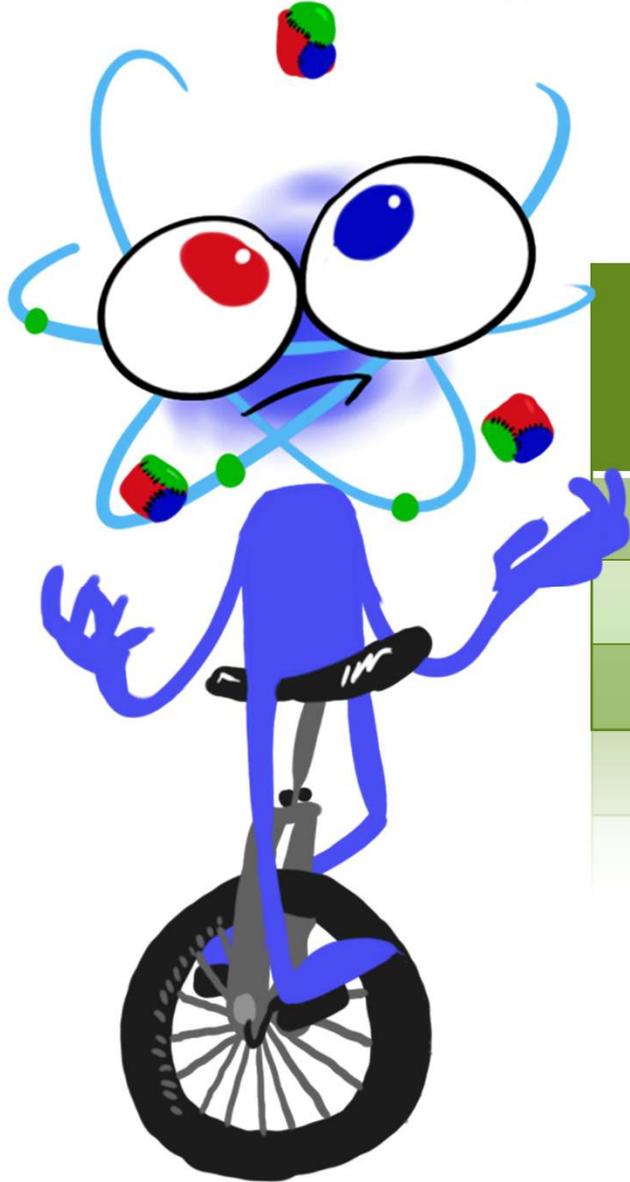


Why Physics?

One Student Today, One Nation Tomorrow!



Europe & Asia vs. United States



	Physics	Computer Programming	Chemistry
6 th grade	+		
7 th grade	+	+	
8 th grade	+	+	+
	↓	↓	↓
	↓	↓	↓
	↓	↓	↓
	↓	↓	↓





SEE THE CHANGE USA PHYSICS LAB
Bringing Physics to Middle Schools of America

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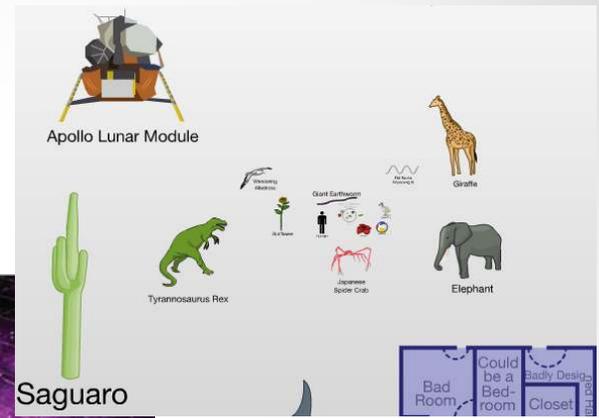
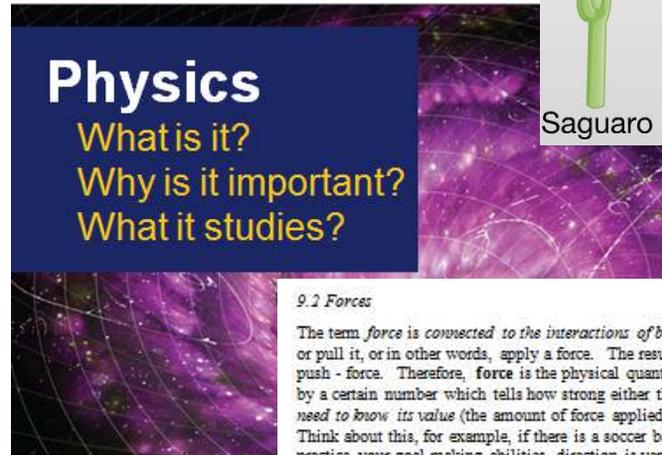
Sign Up

One Student Today, One Nation Tomorrow!



Physics In Middle Schools

- Easy to follow Student Materials
- Logical Sequence of Topics
- Comprehensive Teacher Documents and Support
- Thorough Assessment
- And more!



9.2 Forces

The term *force* is connected to the interactions of bodies. For example, to move a rock you need to push or pull it, or in other words, apply a force. The result of every interaction will depend on the amount of push - force. Therefore, **force** is the physical quantity which characterizes interaction quantitatively, or by a certain number which tells how strong either the push or pull is. In order to *characterize a force* we need to know its value (the amount of force applied) and also its direction and point of application. Think about this, for example, if there is a soccer ball sitting at rest in front of you, and you need to practice your goal-making abilities, direction is very important! You might kick the ball with the same amount of force every time, but if you ignore direction, that is of no help to you making a goal. Once you take direction into account, you can begin aiming for the goal. As you see where the ball ends up with each kick, you can then adjust at exactly what point on the ball you apply the force. As you change the point of impact, the direction that the ball goes in will change. See Figures 9.8.



Figure 9.8 Direction and point of application of force matters!
It can be the difference between
Not making a goal and... making a goal

Let's suppose one day you are walking along the sidewalk. All of a sudden you see a runaway baby stroller (with a screaming baby in it) heading into the street, with a desperate mother running behind and yelling! You decide to be a hero and run towards the stroller. You know that when you get to it, you will

Drawings and Tables and Graphs – OH MY!

①

The goals of this lesson

- ❖ understand why drawings, tables, and graphs are used in Physics
- ❖ become a PRO at building the Line Graphs

LESSON 3
Drawing, Tables, and Graphs in Physics

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Dave Csintyan

CEO/Co-Founder **See The Change USA**



Colorado Workforce Development Council

Business Owner

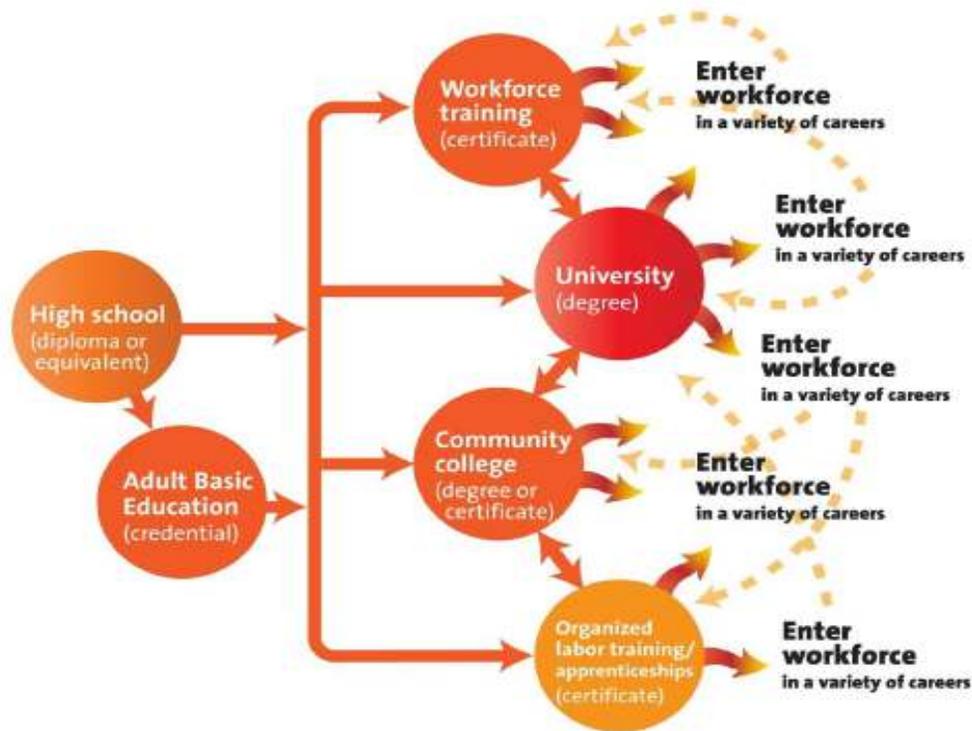
CEO, Colorado Springs Chamber
of Commerce

Ford Foundation Fellow...
Economic Development



Career Pathways

Effective career pathways rely on coordination across education and training programs in order to offer a clear sequence of industry-relevant coursework and credentials to job seekers. Today's education and training programs include online and in-person opportunities.

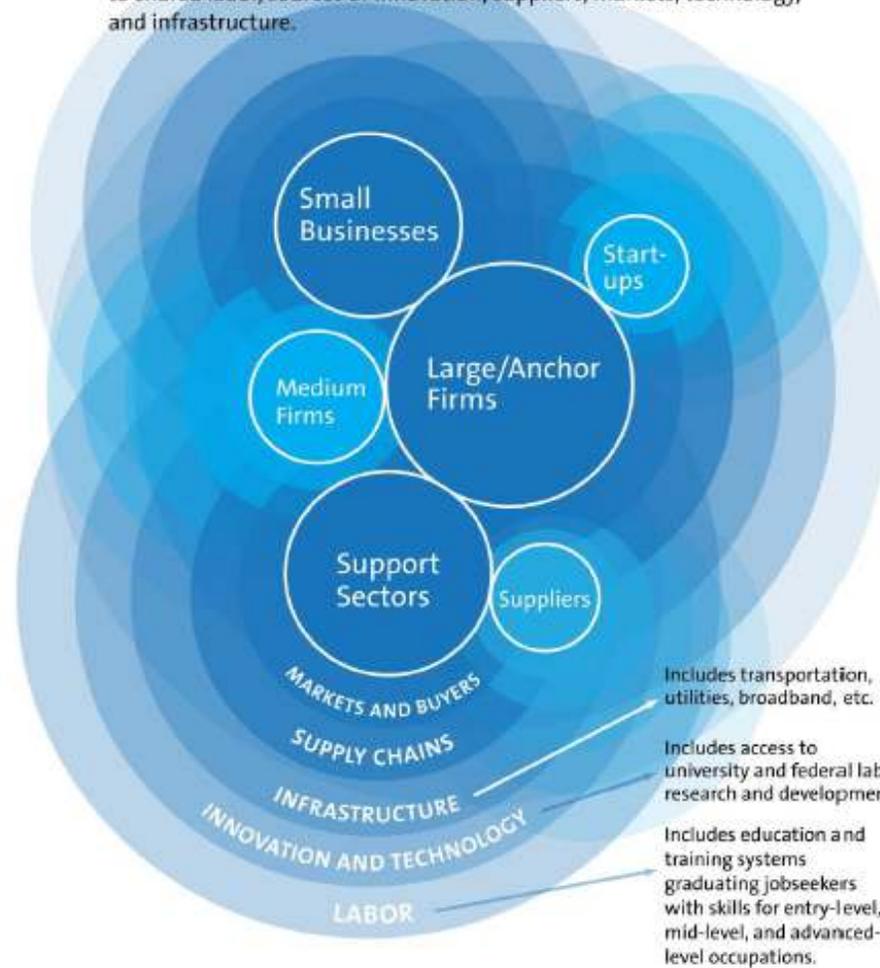


After being in the workforce, a person may choose to go back for more credentials to make an upward or lateral career move.



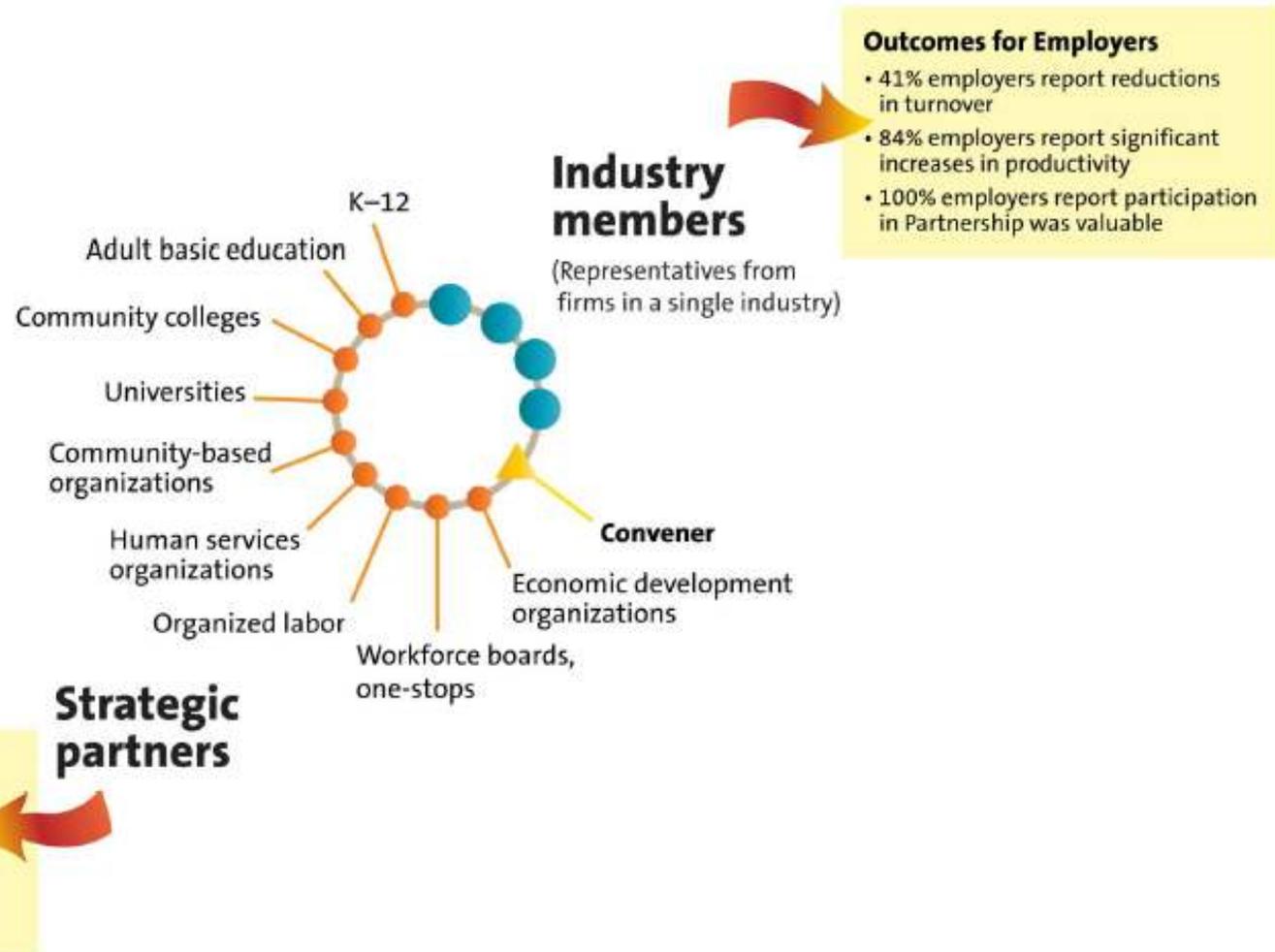
Industry Cluster

An industry cluster consists of large and small firms in a single industry. Firms in industry clusters benefit from synergies of association related to shared labor, sources of innovation, suppliers, markets, technology, and infrastructure.



Sector Partnership

The partnership addresses common needs of employers and generates coordinated solutions that benefit workers.



What Will New Mexico Communities See?

- **Work ready employees**
- **Critical thinkers – across all occupations**
- **Retention of today's youth (career pathways)**
- **Home grown talent**



One Student Today, One Nation Tomorrow!



Customer/Funder Base

Students: ~3,600

Teachers: 42

Schools: 10

Supporters/Funders: 14



Supporters:

**Anschutz
FOUNDATION**



GEJOHNSON
CONSTRUCTION COMPANY



**Ed & Mary
Osborne**



CAMA

Colorado Advanced
Manufacturing Alliance





Current Schools Implemented:

- Carmel Middle School, Colorado Springs, CO
- Corpus Christi Catholic School, Colorado Springs, CO
- Lake County Middle School, Leadville, CO
- Academy for Advanced and Creative Learning, Colorado Springs, CO
- Chavez/Huerta K-12 Preparatory Academy, Pueblo, CO
- Sacred Heart Catholic School, Gallup, NM
- Fox Meadow Middle School, Colorado Springs, CO
- Panorama Middle School, Colorado Springs, CO
- Mountain Vista Community School, Colorado Springs, CO
- West Middle School, Grand Junction, CO



Performance Measures

Think Three Prongs

1. State Assessments:

Expect a 10% increase in scores in any area of science, per grade level, year on year, continuously. (This is precisely what Carmel Middle School experienced as our first adopter school.)

2. Curriculum Assessments:

These are school district specific and administered 1-3 times per year. These are internal student growth assessments used as predictors and validators of the state metrics.

3. National Assessment (ACT Aspire):

This speaks to the science component of this national assessment, is aligned with the Common Core and is used as a prerequisite for taking the ACT in 11th grade and achieving the minimum score of a 21. (Harrison starts these assessments with 3rd graders and year on year thereafter.)





Simple and Proven Solution Testimonials:



...Middle School *See The Change USA* physics was implemented in January 2014. After only three months, Sister Christi Ann Laudolff and Principal Barbara Kozeliski reported the following:

“6th grade smoked the IOWA Assessment test! All students except three are testing at a 7-10 grade level! These exceptions are new students and we don't have any previous data on them. All other students test scores went up from previous data. Most of the students are actually testing at a 9-10 grade level! Sacred Heart is generally ahead of the rest of the country, sometimes as much as 10%” -Sister Christi Ann Laudolff

Principal Barbara Kozeliski says “These are the best scores in the whole school! Everyone's excited-even students! Physics works! Sr. Christi is thrilled!”





...Response to *See The Change USA* physics program.

As a teacher, this curriculum is giving me the opportunity to integrate math and science concepts with the students. Lessons are well planned and are student centered. As a prior high school physics teacher, I would have loved to receive students into high school with this type of background. As upper level teachers, we too, would have to restructure the high school curricula.

The other part that I love is watching the insight happen. The students' faces light up when they "get" a concept or see connections to their lives. As they present answers, it is easy to see when they understand and when they are simply parroting an answer.

The students are also building and reinforcing many skills in math, graphing, and higher level thinking. -Sister Christi Ann Laudoff

Student responses:

"We're learning a lot of science!"

"I love doing all the lab activities. It's a lot better than reading the book and answering questions."

"The labs are a lot of fun."

"This course really makes me think."





SCHOOL DISTRICT TWO
HARRISON

*Character Through Diversity,
Challenge & Accomplishment*

See The Change USA Presentation

Dr. Wendy Birhanzel
Curriculum, Instruction, and Assessment Officer
Harrison School District 2
Colorado Springs, CO

Background on HSD2

- ▶ District covers 19 square miles
 - Inner city school district in Colorado Springs
- ▶ District serves 11,250 students
- ▶ Schools include:
 - 13 elementary schools
 - 1 K-8 community school
 - 3 middle schools
 - 1 high school preparatory academy
 - 2 high schools
 - 1 home school academy
 - 2 charter schools



SCHOOL DISTRICT TWO
HARRISON

*Character Through Diversity,
Challenge & Accomplishment*

HSD2: Who are our students?

- ▶ 11,250 students
- ▶ 79% Free and Reduced
- ▶ 15% SPED
- ▶ 20% ELL
- ▶ Ethnicity
 - 45% Hispanic
 - 25% Black
 - 25% White
 - 5% Other



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HSD2 Strategic Plan: Mission Possible 2013-2017

▶ Targets

- 90% Graduation rate(77.5%)
- 70% of seniors scoring a 21 or higher on ACT (33.6%)
- 100% acceptance rate to college or military (79.5%)
- 70% of 8th graders earning credit for 9th grade Integrated I (16.9%)



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History of See The Change USA and Physics in HSD2

- ▶ August 2012 – Carmel started Physics for most students
- ▶ January 2013 – All students at Carmel enrolled in Physics for their Science course
- ▶ August 2014
 - All students at Fox Meadow Middle School enrolled in Physics
 - All students at Panorama Middle School enrolled in Physics
 - All students at Mountain Vista Middle School enrolled in Physics
 - All students at High School Preparatory enrolled in Physics



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Current See The Change USA Model in HSD2

- ▶ Every student takes Physics in 6th, 7th, and 8th
- ▶ Units incorporate CO standards through the lens of Physics



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How does See The Change USA support schools/districts?

- ▶ Kick off Planning Meetings
- ▶ Curriculum support
- ▶ Demonstrations
- ▶ Ongoing teacher support (in person and online)
- ▶ Monthly (or more frequent) check-ins and communication with leadership
- ▶ Ongoing meetings to provide feedback on units and curriculum



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Why Physics in Middle School?

▶ OUR STUDENTS

- ▶ National epidemic – our students can't compete
- ▶ Starts proficiency and connections with math, science, and critical thinking
- ▶ Break stereotypes
 - Engineering degrees
 - 18% Women
 - 4.5% Black
 - 7% Hispanic
- ▶ Aligns with target goals
 - Graduate at a rate of 90%
 - Graduate 70% of seniors scoring a 21+ on ACT
 - Reach a 100% acceptance rate to college or military
 - Attain 70% of 8th graders earning credit for 9th grade Integrated I



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Impact

- ▶ **Student Growth**
 - State test: 72 (typical is 35-65)
 - 1st year cohort increased overall proficiency in Reading, Writing, Math, and Science by 10% points over 2 years
- ▶ **Student Achievement**
 - 80% of students in physics receiving As and Bs in math and science compared to 40% prior
 - On district assessments, students in the physics program performed 4-6% higher on math and science assessments than those not in physics program



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Future Impact

- ▶ Life
 - Critical Thinking
 - Understanding World Around Them
- ▶ Student Achievement
 - Science
 - Math
 - Critical Thinking
 - Language Arts
 - Social Studies
- ▶ Student Opportunities
 - Increase numbers of students accepted to college
 - Increase students seeking careers in math and science



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*Character Through Diversity,
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All leading to.....

Increasing the choices
students have in life
and the impact they
have on future society



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Challenge & Accomplishment*

It's all about the students!

- ▶ “I hated Science before starting Physics this year. Now it makes sense to me and I even explain to my sisters how things work.” (Ilesha, FMMS 7th grader)
- ▶ “I was in Physics for two years at Carmel. Because of what I learned I want to become an engineer.” (Mikala, 9th grader at Sierra HS)
- ▶ “I really hated math, but Physics helped me understand math better and see how math is in everything we do.” (Ade, CMS 8th grader)
- ▶ “I didn't even graduate high school and now my son is taking Physics in middle school. It is crazy and I am so blessed for him to have this opportunity.” (Karina, mother of CMS 7th grader)
- ▶ “The material students learn is one thing; the confidence this instills in students is priceless. Students have pride that they are in Physics and they see it helping their understanding and achievement in all classes. That is something data can't measure.” (Ted Knight, founding Principal of See the Change at CMS)



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Challenge & Accomplishment*

Thank You!

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Implement, Support, Contribute, Sponsor

www.seethechangeusa.org

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